UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL
CLEANUP

FEB 2 1 2013

MEMORANDUM

SUBJECT: Region 10 Response to National Remedy Review Board and Contaminated Sediments Technical Advisory Group Recommendations for the Lower Duwamish Waterway Superfund site

FROM: Richard Albright, Director
Office of Environmental Cleanup

TO: Amy R. Legare, Chair
National Remedy Review Board

Stephen J. Ells, Chair
Contaminated Sediments Technical Advisory Group

EPA Region 10 appreciated the opportunity to present our proposed cleanup plan for the Lower Duwamish Waterway Superfund site to the National Remedy Review Board (NRRB) and Contaminated Sediments Technical Advisory Group (CSTAG). Region 10 has considered your input in development of its Proposed Plan. Our responses to your comments are provided below.

Site Characterization

NRRB/CSTAG Comment: *In light of the presentations, the boards recommend the Region consider collecting the following information prior to implementation of the preferred alternative: 1) additional toxicity testing to refine the cleanup area footprint; and 2) baseline monitoring data for fish, shellfish and the water column over multiple years. These monitoring data can be used to evaluate the effectiveness of any implemented remedial actions.*

Region 10 response: Sampling conducted during remedial design, prior to implementation of remedial action, will include additional sediment chemistry and toxicity testing to refine the cleanup area footprint and collection of monitoring data for fish, shellfish, and water over multiple years to serve as a baseline dataset to evaluate the effectiveness of the remedial actions. However, the number of years for which we can collect pre-cleanup baseline data will be limited by the timeframe between completion of the EAAs and start of remedial action. The Region believes starting the cleanup is a higher priority than collecting additional years of pre-cleanup data.

Remedial Action Objectives and Cleanup Levels

NRRB/CSTAG Comment: *Explain RAOs more clearly - Based on the package submitted by the Region, it appears that the overall result of the Region's preferred alternative should be a significant net reduction in sediment contamination and fish tissue PCB levels, and a net increase in allowable fish*

consumption compared to current conditions. At the same time, it appears that the Region's preferred alternative may not achieve fish tissue concentration levels that ensure protectiveness of human health without the addition of institutional controls (ICs) and also may not meet State standards (potential applicable or relevant and appropriate requirements [ARARs]). In addition, the Region acknowledged that recontamination (anthropogenic) from incoming Green River water and sediments is likely to raise contamination levels after cleanup of the site's sediment. The boards recommend that the decision documents clearly explain how the remedial action would achieve the Region's remedial action objectives (RAOs) and how institutional controls (ICs) to limit fish consumption can help ensure protectiveness of human health in the long term.

Region 10 Response: To clarify, incoming Green River sediment contaminant concentrations are far lower than conditions currently present in the Lower Duwamish Waterway (LDW). Green River suspended sediment PCB concentrations are currently on the order of 36 ug/kg dry weight (dw). These concentrations are higher than expected post-cleanup concentrations in capped, backfilled, and ENR areas, but lower than the sediment concentrations in most of the areas designated for MNR. The Region expects that post-cleanup, LDW-wide contaminant concentrations will continue to decrease over time as incoming Green River suspended solids settle in the LDW until the system reaches a steady state. The State is currently collecting additional information on sediment and water contaminant of concern (COC) concentrations in the Green River and will use this information to determine what actions can be taken to reduce incoming sediment contaminant concentrations, for example, working with upriver communities to improve storm water management practices. The natural recovery model (which uses current Green River suspended sediment contaminant concentrations) projects that the system would equilibrate to about 46 ug/kg dw PCBs, far lower than the RI baseline PCB surface area weighted average concentration of 346 ug/kg dw, about 10 years after completion of the remedial action, and about 40 ug/kg dw in the long-term if Green River inputs remain unchanged. These projections are highly uncertain, however, sensitivity analysis indicates substantial reduction in COC concentrations relative to current conditions even using high-end predictions for all input parameters. Food-web model projections indicate that post-cleanup fish and shellfish tissue concentrations will be significantly reduced compared to pre-cleanup conditions, but not enough to fully lift fish advisories. The objective of the remedy and the State's source control program is to reduce COC concentrations to meet State and federal ARARs. If in the future it is determined that ARARs cannot be met, this will be documented in a future decision document along with an Administrative Record supporting this decision. The Proposed Plan includes supplementation of the remedy with fish advisories, enhanced by robust public outreach and education to further reduce exposure to COCs consumption of resident seafood before, during and for many years after the cleanup.

NRRB/CSTAG Comment: *<u>Scope of the CERCLA cleanup</u> - Based on the package and presentation to the boards, it is not clear whether or how the Region's preferred alternative would address potential contamination from groundwater, surface water and upland/upstream sources. For example, the information provided to the boards was unclear regarding the connection between the contaminants of concern (COCs) in sediment, pore water and surface water. Furthermore, while RAO #1 mentions surface water, the package and presentation did not include any thoroughly analyzed alternatives specifically focused on reducing surface water contamination or discussion of related ARARs compliance. The boards recommend that the Region clearly explain in its decision documents what this particular remedial action is intended to accomplish using CERCLA authority, what is being addressed by other parties under separate authority (e.g., how the State intends to use its own authority to control anthropogenic upland/upstream sources working as EPA's partner at this site) and what might be addressed in possible future CERCLA remedial actions.*

Region 10 Response: The Proposed Plan explains the scope of the CERCLA cleanup, what work is being done under State authorities, and how groundwater, surface water and upland/upstream sources are being addressed in a coordinated site strategy. The Proposed Plan will include an appendix containing the State's draft Source Control Strategy to address ongoing sources. The overall strategy for addressing contamination in the LDW and surrounding watershed includes: 1) cleanup of the most contaminated sediments as "Early Action Areas" under CERCLA removal, RCRA corrective action or State authority; 2) State-led control of sources, predominantly under State authority; and 3) long-term cleanup of contaminated sediments under CERCLA pursuant to the contemplated Record of Decision (ROD). These three components together are designed to address the areal extent of contamination at the Site, including resident seafood tissue concentrations and surface water quality to the fullest practicable extent.

NRRB/CSTAG Comment: *Use of State standards - Based on the package and presentations made to the boards by the Region, State, and tribes, the cleanup levels for most alternatives and the criteria used to delineate the extent of "area of potential concern #1" (AOPC #1) were based on the State's ecologically-based sediment quality standards (SQSs) and cleanup screening level (CSLs). The boards note that a key goal of RAO #1 is the protection of human health from the ingestion of fish and shellfish contaminated with polychlorinated biphenyls (PCBs). In addition, the boards note that the SQS for PCBs (240 parts per billion [ppb]) and the CSL for PCBs (1300 ppb [using a total organic carbon of 2 percent]) are also the preliminary remediation goals (PRGs) for RAO#3 (protection of ecological receptors). The boards recommend that the Region clearly explain the use of the SQSs and CSLs in its decision documents with regard to developing RAOs #1 and #3; the Region also should explain why it used 240 ppb as the PRG for RAO#3 when site-specific toxicity tests in some cases showed no toxicity at this concentration.*

In addition, the package and presentation to the boards indicated that the Region's preferred cleanup alternative (5C) would select a cleanup level for sediments exceeding 240 ppb for PCBs (even though the ultimate cleanup goal to protect human health based on MTCA would be 2 ppb). The boards recommend that the Region's decision documents clearly explain the basis for selecting 240 ppb as a trigger for action, for determining health-based cleanup levels and for delineating the areas that need to be actively remediated.

Region 10 Response: The State SQS and CSL were developed to protect benthic invertebrates and thus were used as PRGs for RAO 3 (protection of benthic invertebrates).The applicable State regulations require cleanup as close as practicable to the SQS but in no case above the CSL for surface sediments (WAC 173-204-570(4)). The FS examined a range of alternatives, some of which (e.g., Alternative 5) were projected to meet the SQS at the completion of construction, and some incorporated a period of 10 – 20 years of natural recovery to meet the SQS. The SQS for PCBs is 12 mg/kg organic carbon (OC). (We used the dry weight equivalent of 240 ug/kg at 2% total organic carbon in the NRRB presentation and in our responses because most people are more familiar with those units, but will use the OC-normalized State standards in our decision documents.) Although in some cases toxicity testing results did not fail at or above 240 ug/kg dw PCBs, the RAO 3 PRG was not lowered because far more testing would be required to reliably set a different numerical standard and because the 240 ug/kg PCB standard serves a dual role of protecting benthic invertebrates and reducing PCB toxicity to humans (as well as other ecological receptors) due to bioaccumulation in the food chain. Our decision documents will allow a toxicity text "pass" to override chemistry results in remedial design sampling and long-term monitoring for the 39 COCs that are not also human health COCs (the human health COCs are PCBs,

arsenic, dioxins/furans, and carcinogenic PAHs), if they are not collocated with human health COCs. For the human health COCs, toxicity test results will not override chemistry results because passing the toxicity test for benthic organisms is unrelated to protection of human health.

With regard to RAO 1, the FS Alternatives employ a range of PCB RALs because they rely on varying combinations of active remediation, and natural recovery with its accompanying greater uncertainty, to reduce contaminant concentrations. Alternative 2 with a PCB RAL of 2,200 ug/kg dw relies the most on natural recovery (other than the no action alternative), while Alternative 6, with a PCB RAL of 100 ug/kg dw, relies the least on natural recovery. The RAL for the preferred alternative, Alternative 5C Plus, is 240 ug/kg dw. This RAL coincides with the SQS for PCBs in part because it achieves RAO 3 without relying on natural recovery, but more significantly it achieves the best balance of short term effectiveness, long-term effectiveness and cost relative to other alternatives.For example, lower cost Alternative 4 takes longer to reach the same objectives and has more uncertainty in its projected long-term outcomes, while Alternative 6 has a much longer construction time at significantly higher cost. Alternative 5C Plus has a moderate construction time, which is particularly important because fish and shellfish contaminant concentrations will be elevated during and for some time after construction.

NRRB/CSTAG Comment: *Fish tissue levels for monitoring - The boards recommend that in order to evaluate the effectiveness of the cleanup in ensuring protectiveness of human health, the Region consider development of a risk-based tissue concentration for specific fish and shellfish reflecting realistic consumption scenarios. This fish tissue concentration could be used to monitor progress in achievement of RAO #1 by providing a metric for what the Region believes is a protective risk-based consumption level. For example, the decision documents could State that: "To ensure protectiveness of human health at this site, a tissue level of x.xx ppb PCBs in fish fillet will be used to evaluate whether the cleanup achieves an acceptable cancer risk based on the adult tribal RME resident seafood consumption rate of 97.5 g/day." Furthermore, the boards recommend that the Region consider developing interim target concentrations in fish tissue for specific scenarios (e.g., central tendency, other meal consumption rates, etc.) for inclusion in its decision documents as interim monitoring measures designed to provide data for cleanup progress evaluation (e.g., metrics to be used for gauging remedy effectiveness and movement toward attainment of the RAOs/remedial goals). Such monitoring targets, once they are reached, could be used to evaluate whether future relaxation or modification of the fish consumption advisories and fishing restrictions would be appropriate (e.g., changing the "eat none" advisory for Lower Duwamish Waterway [LDW] resident fish and shellfish as conditions improve).*

Region 10 Response: Region 10 has developed species-specific tissue PRGs for the Proposed Plan, based on either risk based threshold concentrations (RBTCs) at the 10^{-6} excess lifetime cancer risk level or, where data are available, fish and shellfish tissue contaminant concentrations from non-urban areas in Puget Sound as natural background concentrations, whichever is higher. This approach is consistent with the approach used for setting sediment PRGs using the requirements of MTCA, which are state ARARs. During the RI, background tissue data were collected for arsenic only. For the remaining human health COCs, we compiled tissue data from multiple studies conducted for various purposes to derive background values. There are significant uncertainties associated with much of this data due to low sample size, high number of non-detected values, and uneven spatial and temporal sample distribution. Because of this, the Proposed Plan includes provisions for additional sampling in the remedial design phase to provide a better background dataset. If the Region determines that the tissue PRGs need to be updated based on new background data, the decision will be documented in a future decision document.

We have also presented in the Proposed Plan information on risks at model-projected steady state values and risks at PRGs at a range of ingestion rates (including the tribal reasonable maximum exposure rate), so that members of the public can evaluate risks based on other ingestion rates and the information can be used to assess progress towards achieving long-term cleanup goals.

Remedy Performance

NRRB/CSTAG Comment: *Interim remedy approach -The preferred alternative advocated by the Region represents a comprehensive approach to improve the environmental quality of the LDW. The effectiveness of the ongoing source control efforts by the State at this site is uncertain at this time. Current natural recovery model predictions indicate that final PCB sediment levels will be in the order of 40 ppb (based on the influx of sediments from the Green/Duwamish River), substantially higher than the PRG of 2 ppb. The higher level (40 ppb) reflects the anticipated upstream (anthropogenic) conditions. The PRG of 2 ppb is derived from a 2008 EPA study and is the natural background concentration required to be met under the Washington Model Toxics Control Act (MTCA) (a potential ARAR). However, as explained by the Region, under MTCA, if the human health risk-based threshold concentration is less than natural background, then the default is to natural background, in this case 2 ppb. Based on the information provided to the boards, the PRG does not at this time appear to be achievable even if sources are addressed. The Region should acknowledge in the remedy decision document that: 1) sources need to be addressed, and 2) the goal of achieving 2 ppb will be addressed at an appropriate point of time in the future based on data following this remedial action. As such, the boards recommend that the Region consider selecting a cleanup as an interim remedy.*

Region 10 response: While we understand and acknowledge NRRB/CSTAG's concerns, Region 10 believes that a Proposed Plan for a final remedy is appropriate, given the comprehensive remedy being proposed for the site. Our decision documents will fully acknowledge that sources need to be addressed and provide information about how they will be addressed. The State's Source Control Strategy to address ongoing sources of contamination to the LDW will be appended to the Proposed Plan. The Proposed Plan explains that the objective of the remedy and the State's source control activities is to reduce lateral and upstream inputs consistent with the goal of achieving natural background values such as 2 ug/kg dw PCBs in LDW sediments. The Proposed Plan acknowledges that our model projections based current data indicate that meeting this standard will be very difficult, especially if upstream condition remain unchanged. The 40 mg/kg PCBs referred to in the comment reflects current upstream conditions, and as noted in the second response above, anticipated future upstream conditions are unknown, and may improve for reasons stated above. If in the future these cleanup levels are not met, the Proposed Plan provides for an assessment of whether there are any other technically practicable measures that can be taken to further reduce COC concentrations. If EPA determines that no practicable measure can be taken to reduce COC concentrations to the natural background-based cleanup levels, we anticipate waiving the MTCA natural background requirement in a future decision document.

NRRB/CSTAG Comment: *Phased approach - The boards recommend that the Region consider an iterative and phased approach to allow for effectiveness monitoring, which would provide more information and better certainty to support subsequent cleanup actions. This approach likely would include both: 1) ICs to restrict fish consumption and 2) monitoring to evaluate the rate of natural recovery as well as other data gathering to help evaluate State and related planned early action areas' (EEAs') ongoing and future source control effectiveness.*

As part of a phased approach, the boards recommend that the Region consider using 2 – 5 years of monitoring data to evaluate the results of the EAAs and help determine the scope of any additional remedial action beyond that selected in the ROD.

Region 10 Response: The Proposed Plan calls for robust sampling in the design phase (likely to occur 2 to 5 years after completion of the EAA cleanups) to assess the reduction in COC concentrations due to EAA cleanups and natural recovery. The cleanup footprint will be adjusted based on remedial design sampling data using the decision criteria in our decision documents. It will also incorporate long-term monitoring to assess the effectiveness of natural recovery and an evaluation process to determine whether additional actions might further reduce COC concentrations and provide additional protectiveness, as discussed in the previous response. Region 10 believes this approach, along with source control, will address human health and ecological risks and attain ARARs to the maximum extent practicable. Additional actions needed to achieve the RALs in the long-term would be addressed under this ROD. The ROD could also be amended in the future to incorporate additional remedial actions in areas with COC concentrations below the RALs if long-term monitoring indicates that additional action can further reduce risks.

NRRB/CSTAG Comment: *MNR - Based on the information presented to the boards, it appears appropriate to consider and evaluate MNR at this site based on model estimates. These estimates indicate the potential for significant risk reduction due to implementation of early actions and MNR in ten years due to the relatively high level of sediment deposition in many areas of the waterway; however, the boards recognize that the site modeling conducted for the LDW has significant uncertainties. The boards believe that considering an MNR and IC-only alternative can provide useful information when evaluating and describing the EEAs' contributions and potential advantages. Consistent with the NCP, the decision document should contain the nine criteria evaluation of all alternatives, including the MNR and IC-only alternative. The boards note that per OSWER Directive No. 9355.0-85, December 2005, Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, MNR should not be confused with a "no-action" alternative.*

Region 10 response: Region 10 agrees it is appropriate to consider MNR for the LDW. The FS includes an in-depth analysis and consideration of MNR, and MNR is part of the Preferred Alternative. The FS evaluates 12 alternatives which rely to varying degrees on MNR, including the no action alternative where all model-projected reductions in COC concentrations stem from MNR, a "remediate remaining high COC concentration areas only" alternative (Alternative 2) to Alternative 6, which does not rely at all on MNR to achieve reduction in COC concentrations. We believe this robust analysis of 12 cleanup alternatives is sufficient for remedy selection, and adding another alternative will not materially affect the analysis of alternatives or EPA's proposal for a Preferred Alternative.

In addition, MTCA regulations specify that "cleanup actions shall not rely primarily on institutional controls and monitoring where it is *technically possible* to implement a more permanent cleanup action for all or a portion of a site." WAC 173-340-360(2)(e)(iii) and 173-340-440(6). In light of this promulgated more stringent State requirement an MNR and IC-only alternative seems only tenuously viable at best. Further, such an alternative would be similar to Alternative 2, described above, and would not have been selected for the same reasons Alternative 2 was not selected. Clearly, alternatives that remove some contaminated sediments, particularly higher concentrations or concentrations in areas most likely to be uncovered, e.g., by vessel traffic in this commercial waterway, provide technically possible more permanent cleanup action consistent with the State regulations.

NRRB/CSTAG Comment: *Modelling - The boards recognize there is significant uncertainty in the natural recovery and food web models predictions. The boards recommend the Region better explain the models' uncertainties and how the preferred alternative would achieve risk reduction, ensure protectiveness of human health and the environment, be cost-effective as well as consistent with CERCLA and the NCP (including the requirements of CERCLA section 121).*

Region 10 Response: The Sediment Transport Modeling Report, the Food Web Model appendix to the Remedial Investigation Report, and the Feasibility Study for the LDW site contain extensive model uncertainty and sensitivity analyses. Model uncertainties will be summarized in the decision documents. In addition, we intend to use data collected during remedial design and following implementation of the remedy to continue to reduce uncertainty associated with the models to the extent possible.

NRRB/CSTAG Comment: *Enhanced Natural Recovery (ENR) - Based on the information presented to the boards, the Region's preferred alternative would use 240 ppb (point concentration for active remediation) for PCBs as the cleanup level for concentrations in the surface sediment and 2 ppb (average concentration in waterway sediments after natural recovery) as the PRG. The Region also indicated that, as part of its preferred remedy in dredged areas with a water depth greater than 10 feet, no backfill would be added once 240 ppb is reached. Although natural recovery is projected by the models to occur in these areas, the boards recommend that the Region consider adding an appropriate layer of backfill in these areas to accelerate the natural recovery process. In addition, for areas shallower than 10 feet that will be capped and backfilled, the boards recommend that the Region consider using a design of a minimal (as small as possible) armored layer (if needed for erosion protection) with an appropriate habitat layer for purposes of protecting the environment.*

Region 10 Response: In dredged areas that do not require backfill or capping, ENR will be employed to reduce COC concentrations if the RALs cannot be achieved through dredging alone. Beyond that, the remedy calls for MNR to further reduce COC concentrations to the PRG. Backfill or ENR is not proposed when post-dredge contaminant concentrations are less than the RAL. Post-dredge monitoring at other projects in our area (including some of the early actions within the LDW) have indicated that post-dredge COC concentrations often decline rapidly, and it would be inconsistent to require that COC concentrations below the RAL be remediated in dredged areas but not in non-dredged areas. For areas shallower than -10 feet MLLW, (considered to be habitat areas by natural resource agencies) that include capping, appropriate capping technology will be used that will include an armoring layer to prevent erosion if needed, followed by an appropriate habitat layer that will support a benthic community.

NRRB/CSTAG Comment: *Dredging - For alternatives that include dredging of areas exceeding the cleanup level, it was unclear in the information presented to the boards how the Region would determine the depth at which dredging would stop. Some of the information seemed to indicate that full removal of the contamination would occur (to a maximum depth of four feet), but during the meeting, the Region seemed to indicate that dredging would occur only to the depth necessary to meet the cleanup level (e.g., 240 ppb for PCBs) and that material with concentrations lower than the cleanup level but exceeding the PRG (2 ppb) would be left in place. It was unclear whether confirmation sampling would be conducted during dredging or whether dredging would be conducted to specified cut-lines based on pre-design data. The boards recommend that the Region clearly explain how it intends to address these issues in its decision documents.*

Region 10 response: The Proposed Plan calls for dredging to the RALs where the depth of contamination is less than 4 feet below the mudline. In areas where elevation must be maintained to preserve habitat (areas above -10 feet MLLW), dredged areas will be backfilled with clean fill. If the depth of contamination above the RALs extends deeper than 4 feet, the area will be dredged to 4 feet and then capped. The Proposed Plan will not specify exactly how confirmation sampling will be conducted because this is typically determined in the design phase.

NRRB/CSTAG Comment: *Background - Based on the package and presentation to the boards, the Green River and upland sources will continue to recontaminate the LDW surface sediments for the foreseeable future. Although the State has a program in place that is designed to address these sources eventually, PCBs and other COCs may not be controlled for many years. The boards recommend that the Region's decision documents explain how the preferred remedy is consistent with existing Agency guidance on the role of background and how final cleanup levels will be set in light of background contamination (e.g., OSWER Directive 9285.6-07P, Role of Background in the CERCLA Cleanup Program, April 2002), as well as OSWER Directive No. 9285.6-08, February 2002, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. Furthermore, the Region should explain the concrete steps and accomplishments that have occurred (e.g., with regard to the LDW upstream inputs and the watershed's combined sewer overflows) since CSTAG's December 2003 recommendations for this site.*

Region 10 Response: EPA guidance recommendations on the role of background are less stringent than the promulgated Washington State MTCA requirement for final remedies of cleanup to natural background when risk-based concentrations are below natural background (WAC 173-340-700(6)(d), among other sections). The Region therefore used the more stringent State ARAR to set background concentrations at the LDW.

The Proposed Plan provides a summary of progress to date in addressing sources of contamination to the LDW and will include the State's Source Control Strategy to address remaining sources as an appendix. The Administrative Record will contain reports elaborating on the State and other parties' efforts to date to address these sources. While the NRRB/CSTAG's comment uses upstream inputs and CSOs as an example, they are by no means the only sources of contamination being addressed under the State's Source Control Strategy. Other important sources include storm water and contaminated upland facilities.

NRRB/CSTAG Comment: *Technology - Based on the presentation (and pre-meeting discussion), the Region is considering using a form of in-situ treatment technology for lowering the bioavailability of PCBs, such as the addition of activated carbon amendments to the sediments, and possibly to address arsenic as well in the 53 acres selected for ENR. The Region noted that the prediction model did not use any activated carbon partitioning data to indicate the potential for less time to meet the remediation goals. The boards support the Region's plans to collaborate with the experts in this evolving field and to conduct further studies (such as batch, column, and pilot-scale) of this technology to better understand physical stability and its effect on reducing bioavailability to biota (clams, fish etc.). A pilot study could provide information on reductions in bioavailability associated with reduced contaminant accumulation by fish and shellfish and the extent to which an in-situ technology could thereby further reduce risks to human and ecological consumers of fish and shellfish. The boards recommend that the Region consider developing a new RAO if a technology proves practical, for example: "Reduce the degree of bioavailability and resulting exposure of PCBs and other organic risk-driving contaminants to levels protective human health and the environment."*

Region 10 Response: Region 10 held a workshop on carbon amendment on February 14 - 15, 2012. Several national experts participated and provided advice on implementing this technology in the LDW. The Proposed Plan calls for pilot studies to be conducted in the design phase. RAO 1 has been changed since the December 2011 NRRB presentation to allow more flexibility in the technology employed to achieve the objective. It now reads: "Reduce to protective levels the human health risks associated with consumption of contaminated Lower Duwamish Waterway resident fish and shellfish by adults and children with the highest potential exposure."

NRRB/CSTAG Comment: *Subsurface - Based on the presentation to the boards, the Region had not yet delineated which areas containing subsurface contamination above 240 ppb should be dredged as part of its preferred alternative, given that the surface concentrations did not exceed this level. The boards recommend that the Region's decision documents explain which site areas would be identified for remediation based on subsurface concentrations above cleanup levels.The decision documents should also explain how the Region would evaluate whether there is a reasonable probability that subsurface contamination poses a risk warranting CERCLA response action to address a potential exposure pathway threat. A large increase in the volume of material to be dredged could change many factors in the detailed analysis provided to the boards and could affect the selection of a preferred alternative.*

Region 10 Response: Region 10's December 2011 presentation to NRRB/CSTAG did have information on which areas were being considered for dredging, but we stated at the time that we were further evaluating this issue and might make some modification to the remedy. Since then, EPA has worked with the PRPs to add more information to the FS regarding the potential for subsurface sediments to be disturbed and the potential impact that might have on sediment COC concentrations in the biologically active zone. This information was incorporated into our analysis of alternatives under the long-term effectiveness and permanence criterion. We have also worked with the PRP group on a memorandum entitled "*Supplement to the Feasibility Study for the LDW Superfund Site, Approaches for Addressing Additional Concerns in Alternative 5C and Development of Alternative 5C Plus Scenarios*" which evaluates several possible modifications to the alternatives presented in the FS to better address the potential for subsurface sediment contamination to become exposed at the surface. This information will be summarized in our decision documents. Based on this evaluation, EPA has made some minor modifications to the preferred alternative presented at the December meeting. The modified remedy calls for dredging an estimated 790,000 cubic yards of contaminated sediments, a 5% increase from the 750,000 cubic yard estimate provided in the December meeting.

NRRB/CSTAG Comment: *Short-term effectiveness - The package provided to the boards included information on an environmental justice (EJ) assessment performed to evaluate the disproportionate impacts to EJ communities associated with the proposed remedy. One measure to offset the potential for short-term increased health risks during construction can be fish trading. The boards recommend further evaluation of a fish trading program in light of potential implementation difficulties and drawbacks (e.g., evaluate commercial fish to ensure that the fish trade program would reduce PCB exposure). The boards recommend that the Region consider appropriate ways to ensure that any such program not be conducted indefinitely and evaluate potential specific plans as to how/when to end the program. In addition the boards note that short-term effectiveness is one of the NCP's nine criteria that can be used to evaluate how an alternative affects human health and the environment during the construction phase of the remedial action and during the length of time until risk reduction objectives are met. As provided in the NCP, this criterion includes consideration of "short-term risks that might*

be posed to the community during implementation of the remedy;" as such, the boards recommend that the Region carefully consider how implementation of any dredging components of the remedy might result in short-term elevations of fish tissue concentrations of site-related contaminants, and evaluate whether populations continuing to consume LDW fish may be at an increased risk of acute health effects as a result of these activities. The boards recommend that the Region address these issues when discussing short-term effectiveness in its decision documents.

Based on the information presented to the boards, the Region estimates that it will take 10 years to complete the planned early actions and the proposed remedy. This timeframe is due in part to the fact that dredging would be limited to about three to four months each year in an effort to protect threatened juvenile salmon leaving the river. Remediation times may also be affected by tribal fishing during salmon runs. Also, there would be elevated PCB levels in tissue of resident fish/crabs during and for a period following dredging. Since the current risks are high due to the known ongoing consumption of fish despite fish advisories already in place, the Board is concerned that the length of the cleanup could significantly increase the current fish consumption risk. The boards recommend that this issue be thoroughly discussed in the evaluation of short-term effectiveness. The boards also recommend that the Region evaluate, and discuss with stakeholders (particularly the tribes, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the State), the option of opening most or all of the rest of the year for dredging to decrease the time of the cleanup and, therefore, the time that the resident fish have an increased level of PCBs. Additionally, the boards recommend that the Region estimate the interim PCB levels in the fish and the associated increase in risk to human health during and for some period after the cleanup. This estimate could be used to help compare short-term effectiveness between the various alternatives and to compare with monitoring data during the cleanup.

Region 10 Response: The evaluation of short-term effectiveness in the FS and Proposed Plan considers potential impacts to the community due to increase COC concentrations during dredging, as does our Environmental Justice (EJ) Analysis. The EJ Analysis recommends several options to try to address disproportionate impacts to the EJ communities and tribes affected by the cleanup. One of the major recommendations is to create a community institutional controls implementation advisory group to provide feedback to EPA on how recommendations proposed by the EJ Analysis could best be implemented in a culturally sensitive manner to optimize their effectiveness. This includes enhanced, culturally sensitive public outreach and education programs to inform the public about the risks of consuming LDW resident seafood, particularly during construction.

The EJ Analysis also recommends consideration of possible means to provide the community with access to alternative sources of seafood. One way to do this would be a "fish trading" program. The Region agrees that implementation of a "fish trading" program would require very careful consideration.The Proposed Plan proposes formation of the advisory group, but does not propose fish trading. If the Region determines, after consideration of input from the advisory group, that fish trading would be an effective means to reduce exposure, and identified drawbacks could be addressed, the Region could propose it in a future decision document.

Region 10 recognizes that the short dredging window increases the length of construction of the remedy with associated impacts of elevated short-term exposures to humans and wildlife. Region 10 plans to talk to the tribes, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and the State about this issue prior to implementation of the remedy. The Region considered deriving a quantitative estimate of increases in fish and shellfish tissue contaminant concentrations and associated risk during dredging when developing the FS, but rejected it because there is no reliable method to develop such an estimate.

We incorporated this concern into the analysis of alternatives by using the length of time to complete constructions as a metric to compare these impacts among alternatives in the short-term effectiveness evaluation, under the assumption that the relative risks due to increased fish and shellfish tissue concentrations during construction would be proportional to the length of the construction period.

Applicable or Relevant and Appropriate Requirements

NRRB/CSTAG Comment: *During its presentation to the boards, the Region presented its position regarding potential state ARARs (e.g., MTCA, sediment management standards, etc.) that should be identified as such in the decision documents. To the extent the State standards are potential ARARs, the Region believes some of them may need to be waived. The boards recommend that the administrative record contain sufficient information to support an ARAR waiver, should one become necessary in the future after additional cleanup work and data collection takes place.*

Region 10 response: MTCA ARARs will be cited in the Proposed Plan, including the more stringent acceptable human health excess cancer risk standard for individual carcinogens of $1x\ 10^{-6}$, and 1×10^{-5} cumulatively for all carcinogens, with a default to natural background as defined in MTCA for final cleanup actions, when risk-based concentrations based on these standards are more stringent than background. The Proposed Plan will state that the objective of the sediment cleanup and source control program is to meet these ARARs, even though in some cases they will be difficult to achieve. We do not intend to waive any ARARs at this time. If, in the future, we determine that ARAR waivers are needed, the bases for waiving these more stringent requirements will be documented in a future decision document as supported by the Administrative Record.

Cost

NRRB/CSTAG Comment: *The package provided to the boards states that the net-present value costs were calculated using a 2.3 percent discount rate instead of 7 percent per OSWER Directive No. 9355.0-75, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, July 2000. The package further states that the rationale for using a lower discount rate is included in the Feasibility Study. The boards recommend that the Region include this information in the decision documents along with costs calculated using both discount rates in order to create parity across all EPA regions.*

Region 10 Response: We will provide this information in the ROD, with supporting information in the Administrative Record.